livestock’s long shadow

environmental issues and options

with particular attention to water

Cees de Haan
Introduction (1)

The economic and social dimension of livestock

– Contribution to world GDP ~ 1.5 %; growth ~ 2.5 % p.a. globally, ~ 5 % in developing countries

– 40 % of agricultural GDP

– Estimated 1.3 billion people in rural households depend on livestock

– Almost 1000 million rural poor depend partially or entirely on livestock for their livelihoods

– Livestock – a last resort for people without alternatives
The health dimension of livestock – Livestock products:

• Provide protein and micro-nutrients to many of the 830 million food insecure people who keep livestock
• Contribute to health problems of the affluent (obesity, diabetes, cardio-vascular diseases, certain types of cancers)
• 70 % of all emerging diseases have their origins in animals
Introduction (3)

The environmental dimension of livestock:

• Land use: 3.4 billion ha of pastures; 33% of cropland dedicated to feed production, of which between 10 and 70 percent “degraded”

• Climate change: 18% of human induced GHG emissions (CO2 equivalent)

• Biodiversity erosion: major pressure factor mainly through habitat change and pollution

• Water resources depletion: feed crops: 8% of fresh water use, 15% of water ET in agriculture
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livestock’s role in water depletion
Water use

- Use for processing, drinking and servicing remains globally insignificant (<1% of global water use)
- But water used by the sector exceeds 8% of the global human water use
- Bulk of water use is associated with irrigation (7%)

Water depletion

- Evapo-transpiration and pollution
- Higher environmental relevance
- But hard to assess at a global scale (estimated at 15%)

3,500 lt. per kg meat
Land use impacts on the water cycle

• Extensive grazing can alter water flows:
  – Reduced infiltration levels, increased run off
  – Destruction of riparian areas
  – Affect the stream flows, lower water tables, transform perennial flow into seasonal

• Land use change: Conversion of pasture into crop, Conversion of forest into pasture and crop
  – Affects the water balance: stream flow, frequency of peak flow, level of ground water recharge

Diverse and complex regional impacts
…hard to quantify globally, but surely substantial
Depletion by Pollution

Pollution from feed production
• Chemical fertilizer application
• Pesticides
• Erosion

Pollution from livestock waste
• Nutrients
• Drug residues
• Biological contamination

Pollution from processing
• Tanneries, Slaughterhouses
Current Waste Handling and Collection

All countries solids collection and hose flush
With often straight discharge into surface water
Location of industrial pig sector in southern Viet Nam
ESTIMATED HOTSPOTS FOR NUTRIENT OVERLOADS
Contribution of livestock

More than 100000 km² with significant livestock induced nutrient overloads
Nutrient loading in the South China Sea

Animal manure accounts for 47% of phosphorus and 16% of nitrogen emission
LLS Approaches

• Getting water price right
  – from supply cost to full cost
• Improving spatial distribution;
  – bring animal waste production in line with absorptive capacity of the surrounding land
• Reducing volume of waste
  – Improving feed and water efficiency
• Treating waste; and
• Providing supporting financial incentives
Improving spatial distribution

Nutrient balance

Predicted areas for sustainable development

Environmental impact

Infrastructures

Land use
Reduce Waste Production

Start at the front end rather than the back end of the animal

Belgium: Breakdown of reduction in P2 O5 (29 million tons) over 1998-2003
<table>
<thead>
<tr>
<th>Technology</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>7-15 percent of cost of production</td>
</tr>
<tr>
<td>Land application</td>
<td>Also high cost, but cooperatively, using direct application, without storage, possible smallholder option</td>
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</tbody>
</table>
Payment for environmental services
## Improvement in Water Quality

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Baseline Mar 2003</th>
<th>Feb 2005</th>
<th>Targets end project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological oxygen demand</td>
<td>11.5</td>
<td>&lt; 1.20</td>
<td>6</td>
</tr>
<tr>
<td>Turbidity</td>
<td>40.2</td>
<td>9.10</td>
<td>25</td>
</tr>
<tr>
<td>% Ephemeropter, Plecoptera y Tricoptera</td>
<td>5.8</td>
<td>10.01</td>
<td>6-8%</td>
</tr>
</tbody>
</table>
The Livestock Revolution continues..

But a more concerted effort to address its environmental, public health and social effects is required and a legitimate Bank concern.